

WHAT IS CLAIMED IS:

1. A functional particle preparing method comprising steps of:
treating either one of a hollow particle or a porous
5 particle having a pore on the surface thereof by plasma
irradiation under a reduced pressure, and
graft polymerizing at least one type of monomer onto the
surface of the plasma irradiated particle by contact between the
at least one type of monomer and the surface of the plasma
10 irradiated particle so as to substantially fill the pore of said
particle with grafted polymers of said monomer; wherein
during said plasma irradiation, plasma intensity and/or the
degree of vacuum are controlled; and
during said contact with said monomer for graft
15 polymerization, at least one of the requirements for monomer
concentration, graft polymerization temperature, and graft
polymerization time is adjusted to control graft polymerization
yield of said grafted polymers.
- 20 2. A functional particle having graft polymerization yield of
grafted polymers obtained from at least one type of monomer, the
grafted polymers substantially filling a pore of said particle,
is controlled by adjusting a reduced pressure, plasma intensity
and/or the degree of vacuum while treating either one of a
25 hollow particle or a porous particle having a pore on the
surface thereof by plasma irradiation, and adjusting at least
one of requirements for monomer concentration, graft
polymerization temperature, and graft polymerization time while
graft polymerizing the at least one type of monomer onto the

surface of the plasma irradiated particle by contact between the
at least one type of monomer and the surface of the plasma
irradiated particle.

5 3. A functional particle preparing method according to claim 1,
wherein:

a solution having an inclusion to be inserted into said
particle is adjusted on a first condition that the grafted
polymers substantially filling the pore of said functional
10 particle is shrunk or hydrophilic;

said functional particle is soaked in the solution having
an inclusion which is adjusted on the first condition;

said solution having an inclusion is adjusted on a second
condition that the grafted polymers of the functional particle
15 is expanded or hydrophobic, and

an inclusion-impregnated functional particle is separated
from said solution having an inclusion.

4. A functional particle according to claim 2, wherein the
20 functional particle is an inclusion-impregnated functional
particle in which the pore and/or a cavity region of said
functional particle are impregnated with an inclusion.

5. A plasma treatment method for uniformly treating all
25 particles by plasma treatment wherein at least one of solid
particles, hollow particles, and porous particles, each having a
pore on the surface thereof, are fixed in a stacked form to
which plasma is irradiated under a reduced pressure while
adjusting plasma irradiation intensity and/or the degree of

vacuum according to the size of each gap between particles[BS2].

6. A functional particle preparing method comprising steps of:

fixing at least one of solid particles, hollow particles,

5 and porous particles, each having a pore on the surface thereof,
in a stacked form, and irradiating plasma under a reduced
pressure while adjusting plasma irradiation intensity and/or the
degree of vacuum according to the size of each gap between
particles so as to treat all the particles by plasma irradiation,
10 and

graft polymerizing at least one type of monomer on the
plasma irradiated particles by contact between the at least one
type of monomer and the particles so as to substantially fill
the pores of said particles with grafted polymers of said

15 monomer.

7. A functional particle preparing method according to claim 1,
wherein said plasma irradiated particle is soaked in a
monomer solution or brought into contact with a monomer gas.

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8. A functional particle preparing method according to claim 6,
wherein said plasma irradiated particle is soaked in a monomer
solution or brought into contact with a monomer gas.

25 9. A functional particle according to claim 2, wherein said
plasma irradiated particle is soaked in a monomer solution or
brought into contact with a monomer gas.

10. A functional particle preparing method according to claim 6,

wherein said plasma irradiated particle is brought into contact with a cross-linking agent simultaneously with or subsequently to said contact with the monomer.

5 11. A functional particle preparing method according to claim 1, wherein said particle consists of at least one of an organic macromolecule and an inorganic macromolecule.

12. A functional particle preparing method according to claim 6,
10 wherein said particle consists of at least one of an organic macromolecule and an inorganic macromolecule.

13. A plasma treatment method according to claim 5, wherein said size of each gap between particles is equal to or greater
15 than 0.01 μm .

14. A functional particle preparing method according to claim 1, wherein said size of each gap between particles is equal to or greater than 0.01 μm .

20 15. A functional particle preparing method according to claim 6, wherein said size of each gap between particles is at least equal to or greater than 0.01 μm .

25 16. A functional particle prepared by the functional particle preparing method according to claim 6.

17. A functional particle according to claim 16, wherein said grafted polymers fill said pore at high density.

18. A functional particle according to claim 16, wherein said grafted polymers fill said pore at low density.

5 19. A functional particle prepared by the functional particle preparing method according to claim 1, wherein said grafted polymers of said functional particle fill the pore at high density.

10 20. A functional particle prepared by the functional particle preparing method according to claim 1, wherein said grafted polymers of said functional particle fill the pore at low density.

15 21. A functional particle according to claim 19, wherein the functional particle is a time-release particle in which said pore is impregnated with an inclusion which is released in response to the extent to which the pore is filled with the grafted polymers and/or variations in temperature around said
20 functional particle.

22. A functional particle according to claim 20, wherein the functional particle is a time-release particle in which said pore is impregnated with an inclusion which is released in
25 response to the extent to which the pore is filled with the grafted polymers and/or variations in temperature around said functional particle.